



# **Vehicle Systems Engineering and Integration Activities**

## **-Phase 2**

**Interim Technical Report SERC-2011-TR-015-2**

**September 30, 2011**

Principal Investigator: Dr. Walter Bryzik, DeVlieg Chairman and Professor  
Mechanical Engineering - Wayne State University

### **Team Members**

Dr. Gary Witus, Associate Professor, Mechanical Engineering  
- Wayne State University

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE <b>30 SEP 2011</b>		2. REPORT TYPE <b>Final</b>		3. DATES COVERED	
4. TITLE AND SUBTITLE <b>Vehicle Systems Engineering and Integration Activities - Phase 2</b>				5a. CONTRACT NUMBER <b>H98230-08-D-0171</b>	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) <b>Bryzik /Dr. Walter</b>				5d. PROJECT NUMBER <b>RT 26-2</b>	
				5e. TASK NUMBER <b>DO2 TTO2</b>	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Stevens Institute of Technology Wayne State University</b>				8. PERFORMING ORGANIZATION REPORT NUMBER <b>SERC-2011-TR-015-2</b>	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) <b>DASD (SE)</b>				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited.</b>					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT <b>TARDEC's mission is to conduct full service life cycle engineering support to the TACOM Life Cycle Management Command and the Program Executive Offices associated with it, for all DoD ground vehicle system acquisition and life cycle management. The TARDEC Systems Engineering Group is constantly looking for systems engineering methods, tools and procedures (MPT) to support this mission. TARDEC has found that many systems engineers from the automobile industry have significant experience in systems engineering (SE), but lack experience in some of the competencies deemed critical to systems engineering in the DoD workforce. This research will identify the differences between education needs of system engineers in both industry and the DoD workforce, and develop methods, processes and tools to address the shortfalls in educating SEs in the DoD workforce. This report summarizes the work done in second phase of the project.</b>					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>UU</b>	18. NUMBER OF PAGES <b>9</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			

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This material is based upon work supported, in whole or in part, by the U.S. Department of Defense through the Systems Engineering Research Center (SERC) under Contract H98230-08-D-0171. SERC is a federally funded University Affiliated Research Center managed by Stevens Institute of Technology

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## RESEARCH TOPIC DESCRIPTION

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TARDEC's mission is to conduct full service life cycle engineering support to the TACOM Life Cycle Management Command and the Program Executive Offices associated with it, for all DoD ground vehicle system acquisition and life cycle management. The TARDEC Systems Engineering Group is constantly looking for systems engineering methods, tools and procedures (MPT) to support this mission. TARDEC has found that many systems engineers from the automobile industry have significant experience in systems engineering (SE), but lack experience in some of the competencies deemed critical to systems engineering in the DoD workforce. This research will identify the differences between education needs of system engineers in both industry and the DoD workforce, and develop methods, processes and tools to address the shortfalls in educating SEs in the DoD workforce.

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Contract Number: H98230-08-D-0171

Report No. SERC 2011-TR-015-2  
September 30, 2011

DO 002, TO 002, RT 26

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## FIGURES

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# 1 INTRODUCTION

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This report documents fourth quarter progress and fifth quarter plans for project RT26. Second quarter activities focused on Task 3 (Case Studies): (a) completing and documenting the case study on MPT to articulate requirements for system attributes leading to versatile ground vehicles, and (b) coordinating with TARDEC on a second case study on the application of SE processes to Science and Technology (S&T) projects. The details of these developments are described in Section 2, Project Status. Plans for the next quarter are described in Section 3, Project Plans.

## 2 PROJECT STATUS

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### 2.1 TASK 1: IDENTIFY TARDEC SE NEEDS

No activity. This task was completed in the first quarter.

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### 2.2 TASK 2: IDENTIFY SE EDUCATION GAPS

No activity. This task was completed in the first quarter.

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### 2.3 TASK 3: CASE STUDIES

In coordination with TARDEC, we are conducting two case studies. The first case study on requirements definition for versatile ground vehicles was previously completed and delivered. The second case study applying SE to Science and Technology (S&T) projects is in progress. We completed the first phase of the study, producing an example instantiation of the RDECOM Project Plan (per OPORD 10-065) including Systems Engineering and technical review artifacts, as the point of the Preliminary Design Review (PDR).

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#### 2.3.1 REQUIREMENTS DEFINITION FOR VERSATILE GROUND VEHICLES



A presentation and draft report on the first case study were completed and previously delivered.

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### **2.3.2 CASE STUDY NO. 2: APPLICATION OF SE TO S&T PROJECTS**

In coordination with TARDEC, we completed the first phase of a case study applying the RDECOM/TARDEC project planning, systems engineering, formal review, and stage-gated evaluation processes to a Science and Technology project. We completed a snapshot of the Project Plan and Systems Engineering review artifacts as of the Preliminary Design Review.

The case study will apply TARDEC's SE process to an example S&T project. The example project is a current Phase II SBIR project sponsored by TARDEC for a retractable mast for small robots to elevate and retract a payload of antennas and sensors. The functional need is to extend and expand line of sight, while retaining the capability to enter small, confined areas. The operational need is to improve communications and surveillance situation awareness in small robots (III Corps ONS & JUONS).

The case study instantiated the RDECOM Project Plan template (OPORD 10-065) for the SBIR project, including the technical review artifacts, systems engineering artifacts, stage-gate evaluation artifacts, and SBIR contracting artifacts, as of the Preliminary Design Review. The Project Plan and associated artifacts are contained in Appendix A.

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## **2.4 TASK 4: DISSEMINATION PACKAGING**

A presentation and draft report on the first case study were previously delivered. The draft report from the first phase of the second case study is attached in Appendix A.

## 3 PROJECT PLANS

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This section describes project plans for the second quarter.

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### 3.1 TASK 1: IDENTIFY TARDEC SE NEEDS

This task has been completed. No activity is planned.

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### 3.2 TASK 2: IDENTIFY SE EDUCATION GAPS

This task has been completed. No activity is planned.

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### 3.3 TASK 3: CASE STUDIES

In the fifth quarter, we will complete the second and third Phases of the case study applying SE to an S&T project. The first phase produced the Project Plan and associated artifacts as of the Preliminary Design Review. In the second and third phases, we will generate the Project Plan and associated artifacts as they would have been at the preceding two technical reviews – the Stakeholder Needs Review and the System Requirements Review. Together, the three snapshots will show the progression of the Project Plan and associated SE artifacts as the project progressed through the first three technical reviews. If time permits, we will continue the sequence of snapshots to the Critical Design Review and Test Readiness Review.

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### 3.4 TASK 4: DISSEMINATION

At the end of the fifth quarter, we plan to deliver a illustrations of the S&T Project Plan and associated SE artifacts as it would be at additional technical review points, for the second case study.